ICM Solutions

Reducing Risks from Oil Spills: The Dongying Experience

- In Dongying, there is a significant risk of oil spills from oil and gas exploration and production activities. The potential threat of adverse economic and environmental impacts is significant, particularly with respect to mariculture operations, which account for 25 percent of sea use in the area.
- To reduce such risks, a national policy framework, effective institutional arrangements, contingency planning from national to enterprise level, and strengthening of detection and monitoring capacity have proven to be effective.
- In order to effectively respond to, restore, and compensate for potential damages to coastal ecosystems and to economic activities that are dependent on such resources, environmental impact assessments are critical in order to provide scientifically reliable baseline information on existing physical, biological, and economic conditions in the marine and coastal area.

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Context

Over the last few decades, the Bohai Sea region (i.e., three provinces and one municipality) has undergone rapid and significant economic development. As of 2010, approximately 20 percent of the country's population was living in the Bohai Sea region. In addition, the region constituted 6.8 percent of the total area of the country and produced 25 percent of the country's gross domestic product (GDP).

Dongying City is located in the estuary of the Yellow River, adjacent to Bohai Sea, connecting the Bohai economic zone and the Yellow River economic zone (Figure 1). It is congested with different types of sea use for economic development along the 413-km long coastline.

The offshore oil and gas extraction and processing industry is the largest proportion of marine industry in Dongying City. In 2008, offshore oil and gas extraction industry generated RMB 10 billion, accounting for 47 percent of marine industrial outputs. In particular, Shengli oilfield, the second largest oilfield in PR China, includes 48.3 billion tons of the petroleum geological reserves (80% can be found in Dongying territory) and 230 billion m^3 of the natural gas geological reserves.

Oil spills are an inherent risk associated with offshore petroleum activities. Satellite images were investigated to identify locations of potential spills related to both ship transportation and oil drilling activities in the Bohai Sea. The assessment represented a distribution of oil spill risk in the Bohai Sea. In total, seven high risk zones have been identified in the Bohai Sea as shown in Figure 2. In recent years, three major oil spill accidents occurred in the Dongying sea area (the "Le'an No. 16": 975 tons oil spill; the Shengli oilfield in No. 106 area: 150 tons oil spill; and the submarine pipelines of Shengli oilfield penetrated by pilferers: 16,523 tons of oil spill). These oil spill accidents caused direct economic losses amounting to as much as RMB 400 million (approximately US$ 63,000,000).

Figure 1. The location of the Bohai Sea and Dongying City (Tong, et al. 2004).

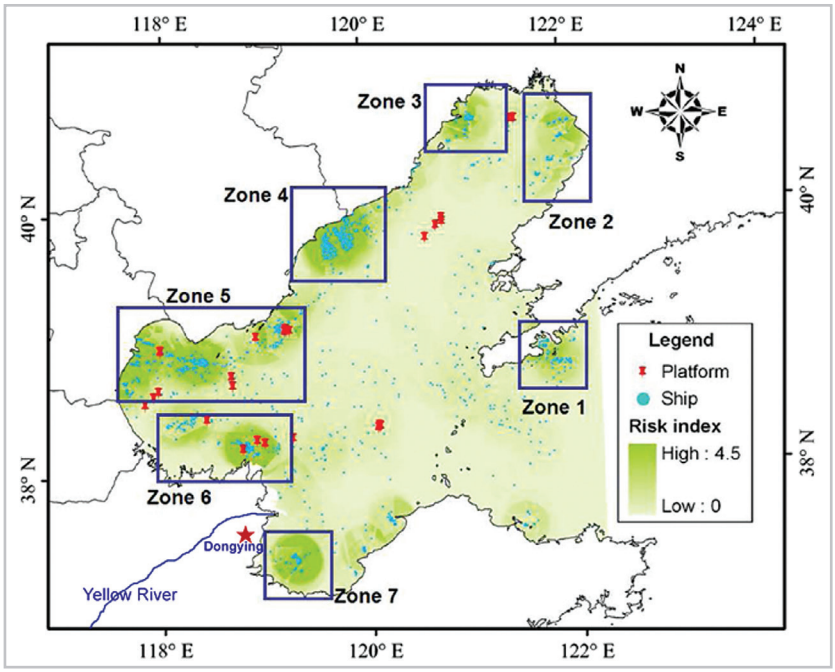

Figure 2. Risk evaluation of potential oil spills in the Bohai Sea based on satellite images together with historic accident data and literature information. Oil drilling platforms were marked in red, while light blue indicate ships. Oil spill risk index was marked in green. Seven high risk zones were identified and marked in blue rectangle. Zone 1-7 are the offshores of Dalian, Yingkou, Huludao, Qinhuangdao, Tianjin, Huanghua and Dongying, respectively. (Liu, et al., 2014).

Solutions

Marine, estuarine wetland, rocks, mud and other types are the main habitats of the coastal zone in Dongying City. The Yellow River Delta National Nature Reserve located in Dongying City is the largest wetland ecosystem in northern China. Therefore, oil spills can severely degrade or destroy the coastal resources and the healthy environments of the city. The ICM program in Dongying City enabled the local government to develop a comprehensive and integrated natural and manmade disaster response and management program so that it can consolidate its available resources across government agencies to address a common threat irrespective of institutional mandates.

Establish the legal framework for oil spill preparedness and response at the national level. China ratified the OPRC Convention in November 2009 and issued a series of laws and regulations concerning the prevention and management of marine pollution from ships. Ratification of the convention served as a driving force and framework that enabled China to improve its national system for emergency response to oil spills, not only from shipping but also from oil and gas exploration and production activities.

Specifically, the State Commission of Public Sectors Reform issued a notice identifying the State Oceanic Administration (SOA) as the responsible organization for the prevention of pollution damage from marine oil and gas exploration. SOA is responsible for monitoring and managing the marine environment, organizing marine environment surveys, and conducting scientific research. It also takes responsibility for the prevention and control of pollution from offshore construction projects and marine dumping. All offshore operators are required to develop oil spill contingency plans for their operations which are to be approved by SOA.

Develop oil spill emergency response plan at the provincial level. In Shandong province, an emergency response plan for oil spills from oil and gas exploration was developed to ensure that the relevant agencies and personnel are able to execute a unified and coordinated response during oil spill incidents. The plan includes oil spill emergency classification, organizational structure and responsibilities, procedure for prevention and early warning, activation of emergency response, emergency response strategies, early warning support systems, news release, subsequent disposal works, etc.

An oil spill incident emergency command center was established, headed by the provincial government, responsible for the unified coordination of the emergency response operation during oil spill incidents. The Director of the Maritime Search and Rescue Center holds a concurrent post for the Director of the Emergency Command Center, while the Deputy Directors of the provincial government office, the Shandong Maritime Bureau, the Beihai Branch of State Oceanic Administration, the Provincial Environmental Protection Office, and the leaders of Marine and Fisheries Department hold the posts as deputy directors of the Center. Emergency command personnel at all levels and personnel at the port of loading and unloading, including emergency personnel at the loading and unloading stations, were trained in emergency operations and issued the corresponding certificates.

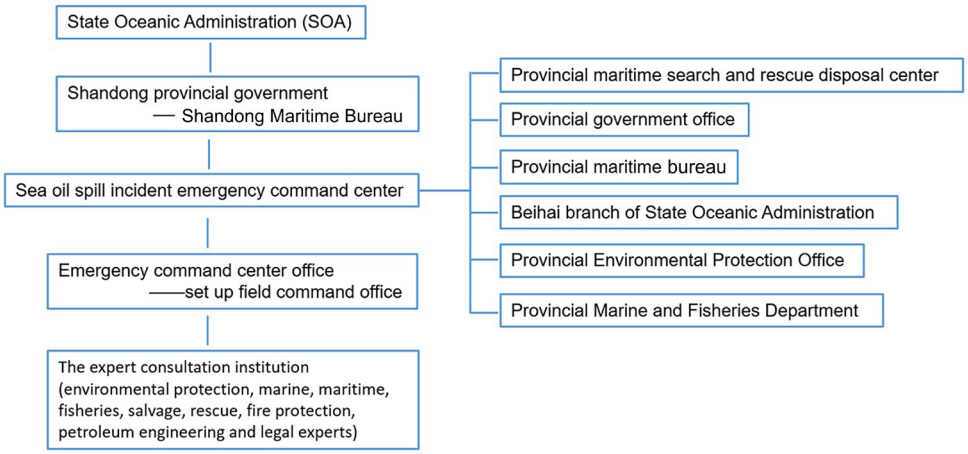

Figure 3. Diagram on the response organization and command system.

Develop oil spill emergency response plan at the city level. Although major oil spill emergency response is usually managed by provincial governments in China, the Dongying government also released the "Dongying City marine oil spill emergency response plan" and established "the oil spill incident command center for emergency response which combined the office affairs with maritime search and rescue center."

Establish an expert consultative group. An expert consultative group was established consisting of representatives from various organizations in related fields of oil spill emergency response, such as environmental protection, marine, maritime, fisheries, salvage, rescue, fire protection, petroleum engineering, and legal experts. The experts participated in marine pollution emergency response operations, research on important issues relating to emergency response activities, and provided advice and recommendations for emergency command decisions and for dealing with the aftermath of the accident.

Develop a compensation mechanism and impact assessment methodologies for valuation of impact of oil spills. The experience from Penglai 19-3 oil spill incident provided a basis for the development of marine ecological impact assessment guidelines to assess damage from oil spills to the marine environment. The guidelines have application for similar incidents that may occur. The guidelines include a penalty and compensation classified into three categories, namely: (1) administrative penalty; (2) compensation for marine ecology; and (3) compensation for the fishery losses.

Responsibility of the City Emergency Command Center.

The city emergency command center is led by the provincial oil spill emergency command center and the municipal government. The center organizes, coordinates, conducts and commands the emergency response to oil spill incidents at sea within its jurisdiction.

Specifically, the center:

- formulates the relevant rules and regulations relating to emergency response and is responsible for the preparation, revision, and management of "Dongying marine oil spill emergency response plan."
- organizes the work conference of city sea oil spill emergency response, and supervises and inspects the implementation of relevant decisions.
- during oil spill incidents, is responsible for organizing the implementation of "Dongying City emergency treatment of oil spill incident."
- in the event of a big oil spill incident, should report developing condition to the superior provincial department, and is responsible for activating the emergency response.
- when the oil spill has spread to the jurisdiction of the neighboring city, is responsible for issuing timely notifications to the concerned city offices and coordinating related matters.
- guides the implementation of the oil spill emergency response plan of related departments and enterprises.

Strengthen local oil spill monitoring capacity to promote prompt and fast response. Oil spills have the potential for serious damage to the marine ecological environment. Fast and accurate detection of the oil spill is of great significance for disaster prevention and mitigation. The Dongying City Ocean and Fishery Bureau has carried out the construction of a new marine intelligent information system. This system focuses on the intelligent information processing and warning function, and upgrades the video surveillance system into an integrated system that is composed of radar, AIS, GIS, buoys, and other relevant techniques. Particularly, Dongying City Ocean and Fishery Bureau is equipped with a multipurpose microwave radar automatic oil spill detection system. The radar monitoring stations were constructed in the estuary of Guangli River, the fishing harbor of Xiaodao River, the central fishing harbor of Hekou district, and the Diaokou fishing harbor. The radar detection system automatically obtains the location of the oil spill, range (contour and area), positioning and continuous tracking, which significantly improves the capability and response efforts in view of the effectiveness of oil spill monitoring and early warning.

Maintain good communication across all levels. Communication programs targeted to potential key stakeholder groups, such as aquaculture farmers, tourism sectors among others, are essential in order to maintain working relationships and awareness in case of emergencies.

Establish partnership arrangements with industries. Partnership arrangements with industries in implementing communication and capacity development programs is important to reduce the negative impacts of oil spills, specifically economic loss to aquaculture.

Results

Leveraged Support for Environmental Improvements

Dongying City has mobilized resources from the petroleum industry to enhance its capacity in environmental management of petroleum exploration and production activities. The investment of Shengli oil field, which was about RMB 8 billion, was used to set up nearly 50 sewage treatment plants and 7 marine environment monitoring stations in the river estuary and petroleum platform. Dongying City also established a marine emergency center and a professional emergency rescue team equipped with an emergency vessel, special fire boats, booms, skimmers and other facilities. Dongying City has also improved the capacities of the marine oil spill emergency response center, the marine pollution early warning and emergency processing system, and the marine pollution monitoring center. Currently, the oil spill emergency response center is capable of handling up to a 3,000-ton oil spill. Dongying City has constructed the maritime management information system and was able to establish a communication network from the national to city level.

Collaborative Planning and Cross-sector Linkages

Contingency planning for oil spills from the national to the local level (including company level) associated with offshore petroleum activities was supported by the existing national policy framework of China. Specifically, all offshore oil operators are required to develop oil spill contingency plans for their operations, including building capacity for response. For instance, the China National Offshore Oil Corporation (CNOOC) has established the emergency planning information system to support its decisionmaking and response during oil spill incidents. Three levels of emergency response planning system were established: (1) crisis management plan at the main company; (2) contingency plans and special emergency plans at secondary units; and (3) emergency response plans at factories and work sites. Each level of the emergency response plan included a corresponding command center.

Industry Responding to the Risks

An effective information management system is the key to an effective response. CNOOC has established a high-technology emergency information management system including personnel management system, 3D emergency information display platform, production facilities emergency database, oil spill simulation tracking system and disaster weather early warning system, among others.

CNOOC also invested RMB 500 million to establish an emergency response team — CNOOC Oil Spill Environmental Service Corporation. All emergency personnel have undergone international professional training and obtained internationally recognized qualification certificates.

Lessons Learned

- A national policy framework on oil spill management facilitates the establishment of a system for oil spill preparedness and response at the city level. However, it is worthwhile for governments to consider additional measures such as better news releases, accurate damage assessment methods, and better claims and compensation channels to promote programs necessary for public involvement.

- Preparedness and emergency response planning to oil spills is most effective when established and connected at various levels: provincial, local and enterprise.

- Providing adequate resources for industrial and environmental safety training, training and emergency preparedness, availability of safety equipment, knowledge on evacuation procedures, and availability and effectiveness of rescue teams can have a positive influence on the overall impact of oil spill incidents when they occur.

- New technologies for rapid and precise reconnaissance and sampling to support a timely and robust response effort and facilitate better integration of "operational" and "scientific" monitoring and data application in planning and implementation of preparedness and response efforts, as well as compensation for damage.

Keywords

oil spill, partnership, scientific support, contingency planning, response, rescue teams, emergency response, claims and compensation

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